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To: Commissioner of Patents and Trademarks, USPTO
2011 South Clark Place
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Prior Art relating to USApp20030058163 and USApp20040021603

Dear Sir,

I am writing to you regarding information I believe is relevant to **USApp20030058163**, filed July 30 2002, titled **"Carrier-Based Differential-Position Determination using Multi-Frequency Pseudolites"** and **USApp20040021603**, filed March 17 2003, titled **"Multi-Frequency Pseudolites for Carrier-Based Differential-Position Determination".** Both applications were filed by Applicant **Integrinautics** of Menlo Park, CA and both were a continuation-in-part of Application No 09/769,823 filed on Jan 24 2001.

Whilst searching the Patent Office web site for documents relevant to this art, I came across the above Applications and obtained copies. After reading the Applications, I am certain that there is a substantial and significant body of prior art that would militate heavily against granting of a patent for these Applications.

Firstly, I apologise in advance if this letter is not in compliance with formal requirements for presenting this type of information before the Commissioner. I am writing this as a concerned individual that has some knowledge of GPS. The intent of this letter is to forward information that will be of some assistance to the Examiner of the above Applications. I am inexperienced in putting forward this information so please forgive the conversational tone of my writing. I will simply lay out the information and the documents I believe are relevant in the best way I can. I trust that the Examiner and the patent system will take the issues I raise into consideration as part of the examination process.

I am presuming that the Examiner has fundamental knowledge of GPS technologies, and I offer the following information:

Overview:
Both applications spring from the original filed document and describe multi-frequency pseudolites (PLs) and their uses. Embodiments in both applications use reference receivers, communication links, and classic RTK techniques. The "new" part put forward is the use of off-frequency PLs, and code rates which are different from standard GPS (although the inventors say that using a fundamental 10.23, and multiples thereof, is useful).

The applications contain very broad and sweeping concepts (very wide lanes and high chipping rates) that are presented as the solution to produce rapid ambiguity resolution (AR) with minimal satellite or user movement. Their AR solution is clearly given in both Applications as the main object of the invention. However, I find absolutely no support for *why* their lane and chipping rate choices are any better than any other traditional choices. In fact, they openly claim that prior art AR techniques must employ satellite or user motion, and this is the main motivation for the "inventive change" in signal plans embodied in the Applications. (*"Unfortunately, establishing proper carrier phase measurements requires one of several initialization procedures to be performed, any of which depend on the geometric layout of the overall system and motion on the part of either the satellites or the mobile receiver. The initialization process is known as carrier cycle ambiguity resolution or integer resolution and can require that the user wait a few to tens of minutes for the satellites to subtend an appreciable arc along their orbits, or it can require that the user move past a fixed pseudolite transmitter."* page 1 [0006] in Application 20030058163 and, *"The motion of the vehicles (shovels, trucks, crawlers, etc.) does not provide large geometry changes with respect to the pseudolites in a short period. Accordingly, an object of this invention is to rapidly resolve integer ambiguity--even without significant vehicle motion relative to the pseudolites."* page 1 [0007-0008] in Application 20040021603) However, there are numerous references for single epoch AR in the literature that do not require movement (several are provided below), hence the very premise upon which both of the inventions are built is extremely suspect.

I will reference the majority of the comments below to the USApp20030058163, as that was the first application filed. However, most comments are applicable to the later-filed application and I refer to that document as appropriate. The best method I can use to supply information to the Examiner is to refer to the independent claims in the applications and show how the specification cannot support the claim because of substantial prior art.

USApp20030058163 Claim 1:
I believe this claim is extremely broad yet the specification has no supporting information to teach someone skilled in the art a method of achieving the stated and desired results. The inventor's key differentiators within the claim and specification relative to GPS are:

a) spreading codes are chosen such that immediate AR is possible and,
b) said modulated signals are designed to provide a significant range of operation.

First, dealing with a) above, which is stated as the first object of the invention. The standard GPS frequency plan and signal structure already provides for immediate AR. Techniques to achieve instantaneous AR are well known in the art and are described in ***"GPS Theory and Practice", Hofmann-Wellenhof, 5th edition, pp 216-220.*** Also, 3-frequency AR is discussed in the same reference ***pp 220-223.*** Further, instantaneous AR with GPS is described by Hatch (1990) in ***"Instantaneous Ambiguity Resolution" in Schwarz KP, Lachapelle G (eds): Kinematic Systems in Geodesy, Surveying, and Remote Sensing", Springer, pp 299-308.*** Numerous other references could be cited for this. It is evident that choosing a carrier signal and spreading code that provides instantaneous AR is not unique. The inventors offer *suggestions* in the specification toward signal and frequency selections. However, the inventors do not teach, show or explain *how* or *why* to select between the options provided, nor as to how to choose other frequency/code rates that could satisfy the stated and desired goals of the invention.

Secondly, modulated signals designed to provide a significant range of operation are covered in the section entitled ***3.7 New Spreading (PRN) Codes for Pseudolites*** in Stuart Cobb's seminal thesis, ***"GPS Pseudolites: Theory, Design, and Applications", pp 73-77.*** This was published in September 1997, and so predates the Application by many years. (It should also be noted that Cobb is named as one of the inventors, so it would stretch credulity to believe the inventors were unaware of this prior publication). In his thesis Cobb also discussed carrier phase AR in the context of pseudolites, so once again that concept in the patent application is neither new nor inventive. Further - Cobb's thesis covers the advantages of using higher chipping rate codes in addition to other signal modifications, concepts that actually extend beyond those described by the inventors in these current Applications.

If the "innovation" could be construed as the application of these choices to pseudolites, GPS history quickly shows that all of the original GPS ground testing was conducted with pseudolites. In 1997, field tests of GPS receivers (with pseudolites providing the ranging signals) were conducted at the Yuma Proving Grounds (GPS Phase 1 User Equipment Field Tests, in ***"Global Position System", papers published in "Navigation" Vol. 1, page 125***). Therefore, simply putting a GPS-like signal on the ground is not inventive, and has been repeated countless times since.

USApp20030058163 Claim 13 and USApp20040021603 Claim 6:
"A multi-frequency receiver".

The only apparent differentiator from any other multi-frequency GPS receiver is in the initial comment of Application 20030058163 "comprising the signal plan of claim 1". As discussed above, I believe the signal plan of claim 1 is not novel since it includes GPS. Therefore a multi-frequency receiver of claim 13 is not novel since it includes multi-frequency GPS receivers also. Yet more importantly than this detail, it is clearly stated in the specification that a *"multi-frequency receiver is different from a dual frequency or L1/L2 GPS receiver,*

which is well-known technology." (page 9 [140] in Application 20030058163 and page 3 [0055] in Application 20040021603). However, there is absolutely no explanation as to exactly *why* or *how* it is different. In fact, the specification then goes on to clearly teach that a standard GPS baseband chip set such as the Zarlink 2021 can be used as the correlator and that the *"circuitry to translate from an input carrier frequency to an IF is well known in the art of RF design."* (page 9 [143] in Application 20030058163). Further, the specification then suggests using a BAE Systems AllStar or SuperStar GPS receiver for the *"tracking unit function."* (page 9 [144] in Application 20030058163). These units are cheap, stock-standard and utterly conventional commercial-grade GPS receivers. It is totally unclear how the invention's "multi-frequency" receiver is any different from any other GPS receiver, as it is solely comprised of existing GPS receiver components and an RF section that is well known in the art. The receiver of the invention is plainly and simply a dual-frequency receiver.

USApp20030058163 Claim 14 and USApp20040021603 Claim 1:
"A multi-frequency pseudolite transmitter"

Both of these claims and their respective supporting specifications suggest that each carrier signal generator is derived from a single oscillator, that carrier is spread with a BPSK code, and then the signal is combined and transmitted with each of the other modulated carriers from the frequency plan. This technique is *exactly* the same as used by the GPS satellites to generate the GPS L1 and L2 frequencies. Quoting from ***ICD-GPS-200-C, 14 Jan 2003*** *"The carrier frequencies for the L1 and L2 signals shall be coherently derived from a common frequency source within the SV"*, ***section 3.3.1.1 title Frequency Plan, page 11.*** This document is the definitive resource for GPS signal design published by the US military. The same signal coherency is defined for the Galileo constellation with the E5A and E5B signals (***Galileo Mission Requirements Document, Issue 5, draft 25, July 2002***).

I have forwarded this information to assist the Examiner in his/her examination and to ensure that the pioneers of the work that is represented by the prior art are accorded due acknowledgement for their efforts. Many of the "inventors" of the above Applications are Stanford graduates, whom I would believe to be necessarily well versed with the history and technology of the industry. I find it almost impossible to believe that the Applicant and inventors were not aware of the work of their peers at the time the Applications were formulated.

I thank the Patent Office for their consideration of the matters I have presented above.

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